Claims

1. A method of transforming heat energy to mechanical energy by expanding an evaporated working fluid by an expansion device (2) connected with an evaporator (6), **characterized in that** the expansion takes place in a low-pressure expansion device (2) and the energy contained in the expanded evaporated working fluid can be recycled into the evaporator (6) and utilized to evaporate additional working fluid.

2. The method according to claim 1, **characterized in that** a first component of the working fluid which is formed as a mixture, is absorbed in and/or downstream of the low-pressure expansion device (2) by means of an absorption fluid, wherein heat is transferred to the remaining, evaporated second component, which is recyclable.

3. The method according to claim 2, **characterized in that** the mixture is an azeotropic mixture at a certain mixing ratio of the components having a minimal boiling point.

4. The method according to claim 2 or 3, **characterized in that** the working fluid is present as an azeotropic mixture or as a nearly azeotropic mixture.

5. The method according to any one of the preceding claims, **characterized in that** the heat transferred in the absorption heats the second component remaining evaporated to a temperature above the boiling point of the mixture, wherein the second component is condensed in a heat exchanger (7) whereby the working fluid is evaporated.

6. The method according to any one of the preceding claims, **characterized in that** the expanded, evaporated working fluid is transformed to a temperature level above the boiling point of the working fluid by means of a heat pump.

7. The method according to claim 6, **characterized in that** the heat pump comprises a liquid-overlapped compressor system.

8. The method according to claim 7, **characterized in that** the compressor system is formed as a fluid-ring pump or as a liquid-overlapped rotary screw compressor.

9. The method according to any one of the preceding claims, **characterized in that** the evaporation enthalpy of the operating fluid of the heat pump is greater than the quadruple of the evaporation enthalpy of the working fluid for expansion.

10. The method according to any one of the preceding claims, **characterized in that** the working fluid has a low volume-specific evaporation enthalpy.

11. The method according to any one of the preceding claims, **characterized in that** the working fluid is a solvent mixture comprising organic and/or inorganic solvent components.

12. The method according to any one of the preceding claims, **characterized in that** the at least one component is a protic solvent.

13. The method according to any one of the preceding claims, **characterized in that** the absorption fluid is a reversibly immobilizable solvent which, in its non-immobilized aggregate state, is the first component of the working fluid.

14. The method according to any one of the preceding claims, **characterized in that** the low-pressure expansion device (2) is a roots blower (2).

15. The method according to claim 14, **characterized in that** the roots blower (2) is provided with at least one injection opening through which an absorption fluid and/or protic solvent can be introduced into the roots blower (2).

16. The method according to any one of the preceding claims, **characterized in that** an absorption device (3), in which the first component is absorbed, is downstream of the low-pressure expansion device (2).

17. The method according to claim 16, **characterized in that** the absorption device (3) is formed as a scrubber (3).

18. The method according to claim 16 or 17, **characterized in that** the absorption device (3) comprises an electrolysis device (4).

19. The method according to any one of the preceding claims, **characterized in that** a separating assembly (5) separates the absorbed first component from the absorption fluid.

20. The method according to claim 19, **characterized in that** the separating assembly (5) is formed as a membrane system (5).

21. The method according to claim 19 or 20, **characterized in that** the separation is carried out by means of evaporating the absorbed first component.

22. The method according to any one of the preceding claims, **characterized in that** the evaporator (6) is arranged upstream of the low-pressure expansion device (2) to absorb the working fluid.

23. The method according to any one of the preceding claims, **characterized in that** a pump (10) feeds the absorption fluid into the separating apparatus (5) and subsequently back to the scrubber (3).

24. The method according to any one of the preceding claims, **characterized in that** the working fluid is an azeotropic mixture of water and silicone.

25. The method according to any one of the preceding claims, **characterized in that** the absorption fluid is a silicate solution.

26. A system for transforming heat energy to mechanical energy, **characterized in that** it comprises the following components:

a) an evaporator (6) in which a working fluid formed as a mixture, can be evaporated,

b) a low-pressure expansion device (2),

c) an absorption device (3) which is integrated with the low-pressure expansion device (2) and/or is downstream of the low-pressure expansion device (2),

d) wherein, in the absorption device (3), a first component of the working fluid can be absorbed by an absorption fluid and heat can be transferred to the remaining, evaporated second component, which is recyclable.

27. The system according to claim 26, **characterized in that** the low-pressure expansion device (2) is a roots blower (2).

28. The system according to claim 26 or 27, **characterized in that** a separating assembly (5) separates the absorbed first component from the absorption fluid.

29. The system according to any one of the preceding claims, **characterized in that** the low-pressure expansion device (2) is coupled to a generator (1) for converting the mechanical energy to electric energy.

30. The system according to any one of claims 26 to 29, which is operable according to any one of the above methods 1 to 25.